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NOTES ON PEMPHIGUS TESSELATA, FITCH.

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SYNONOMY.

Chermes alni Kalm. Travels into North America, English translation, vol. 1, p. 154; p. 121, 2nd ed.

Eriosoma tessellata Fitch. 4th Report State Cab. Nat. Hist., N. Y.

Eriosoma tessellata Glover. Ag. Rept., 1876, p. 39.

Eriosoma tessellata (or *imbricata*) Glover, unpublished plates HOMOPTERA iii., fig. 19.

Schizoneura tessellata Thomas, 8th Report Insects of Illinois, p. 139.

Apparently the first record of this insect is given by Kalm., as cited above, where he says under date of Oct. 3rd, 1748: "I saw to-day the *Chermes* of the Alder (*Chermes alni*) in great abundance on the branches of that tree, which for that reason looks quite white, and at a distance appears as it were covered with mold." This reference, in all probability, is to *P. tessellata*, and the reference to the European species, *Chermes alni* L., a mistake, since there are no later records of the European species being found here, and this one is specifically distinct from the one described by Linnæus.

Dr. Fitch describes the apterous female and states that he had searched in vain for winged individuals. His specimens were from *Alnus rubra*. Mr. Glover states that it was found upon Birch in Maryland. In his unpublished plates he figures the same, referring to it as *tessellata* or *imbricata*.

The newly-born larva is pale brown. The antennæ are 4-jointed, the first joint short, second one-half longer, third and terminal nearly equal and each equalling the first and second together. The dorsal portion of the body is covered with slight elevations which mark the position of the wax-secreting glands. They are arranged in rows, there being three rows on each side in the abdominal segments, except the terminal, which has

none, and the subterminal, which has two on each side. On the thorax and head they are smaller and fewer in number. Length of body 1.25 m. m.

Apterous viviparous ♀. "Dull bluish black; tergum with the segments marked by strongly impressed lines and covered by white down in square checker-like spots. Length 0.16 in." (4 m.m.) Fitch.

The abdomen is covered by long shreds of down, while the thorax and head are simply covered with whitish dust. Antennæ 5-jointed by division of third (?) joint of larval antenna into *two*, while the second joint has apparently shortened.

Fresh specimens of winged ♀ cleaned in alcohol are described in MS. by Dr. Hagen as "head and antennæ black, prothorax pale dirty whitish; thorax chestnut brown; abdomen pale whitish gray, above with six rows of blackish spots; beneath with four blackish fine lines on each side near the middle, not reaching the tip; legs brown; tibiæ and tarsi paler; wings opaque, veins pale, except the mediana of fore wings, which is brown. Full grown nympha is similar to the imago; the wing coverings are black."

Alcoholic specimens of winged viviparous ♀ were dark bluish black with the white filaments on the abdomen less prominent than in the apterous ♀; head and thorax covered with whitish powder. The antennæ are 6-jointed by division of the third (?) larval joint into *three*, the second joint shortening; joints 3-6 are marked with transverse irregular interruptions lined with a thin membrane, while the terminal and subterminal joints contain sensitive glands, as do also these joints in the larva and apterous ♀. Length 4-5 m.m. Expanse 10-12 m.m.

The sensitive glands of the antennæ, which may be seen in the terminal and subterminal joints, are cavities or funnel-shaped openings in the crust, which are lined by a membrane which expands in the middle into a glandular body from which arise from two to four papillæ. In some cases within the border of the cavity can be seen minute ciliæ forming a fine fringe. These organs undergo but little modification during the metamorphoses of the insect. They are prominent in the embryo taken from the viviparous female. In the adult, however, they are partially obscured by other irregularities in the surface. In the winged individuals, where the antennæ are 6-jointed, the terminal joint has at tip five short papilla-like spines, and a little below these four slightly granular elevations, immediately beneath which is an interrupted space in the

crust, and at one side of this a cavity containing a papilla ; the surface of the joint is broken below this in two places by irregular interruptions in the crust, which appear to be lined by more delicate membrane. It is also somewhat roughened and thrown up in places in transverse ridges or elevations ; a few hairs also pass from round openings in the crust. The subterminal joint has very near the end a large opening through the external coat, and within this three large glandular bodies which bear papillæ. Other open spaces are to be seen along the joint, but no glands. The fourth and third joints have also irregular transverse interruptions in the crust, but no papilla-bearing glands.

The papilla-bearing bodies in the last two joints must certainly be organs of sense, though I have not been able to satisfactorily show their connection with nerves. A delicate thread, probably a nerve, can in some cases be seen running through the joints, but preparations from fresh specimens will be necessary to establish its character and connections. The delicate membranous coverings of the transverse irrorations in the crust seem also well adapted to receiving impressions, but their connection with nerves is still undetermined.

The labrum is a slender conical projection beyond the clypeus from which its separation is indistinctly marked, since it contains but little chitinous structure. It is channelled on the under side to near the tip, and from this channel the setæ forming the sucking tube pass in a regular curve into the channel of the labium.

The superior setæ (mandibulæ) spring from cones which originate with chitinous arcs each side of the opening of the œsophagus ; passing forward, they unite immediately in front of the hypopharynx and within the paraglossæ. The inferior setæ (maxillæ) arise from similar cones which lie beneath based upon chitinous structure lying at the superior posterior portion of paraglossal bases. They unite with each other and with the superior setæ at the union of the latter, and pass with these between and in the channel of the paraglossæ, and thence into the groove of the labrum. The paraglossæ are short and setaceous, arising from an inferior lamina which rests upon the base of the labium. The labium is *4-jointed* and reaches nearly to the end of the body in the larva, but only beyond the first pair of legs in the adult ; the tip is surrounded by numerous hairs and a row of bristles extends each side of the groove. Immediately in front of the œsophageal opening appears a denser portion, the epi- and hypo-pharynx, extending to the union of the setæ, and within

this, forming a central row, are eight spots, light in the centre with dark borders, becoming entirely dark with more superficial focussing; apparently these lie immediately above the channel formed by the epi- and hypo-pharynx leading to the gullet.

In *Cicada* the epi-pharynx, which forms the under surface of the clypeus, is channelled, and the edges of channel are raised into two strong arches. In the central portion of this channel is a double row of ten spots similar to those described in *P. tessellata*, and back of these in a direct line toward the pharynx is a sac-like organ apparently with an opening into the channel and with a delicate tube leading from its neck, and within its boundaries two clusters containing four spots each, lying one on each side of the median line.* These spots are very similar to structures that I have examined which are similarly located in the honey ant, and which evidently correspond with the sense organs of the honey bee described as located here.

These organs, which seem never to have been described in Hemiptera heretofore, are present in such Hemiptera as I have been able to examine, and when fresh specimens are at hand, it is hoped that their structure and office may be more fully determined. It seems most probable, however, that they are organs of sense, and their location would warrant the belief that they may be connected with taste, though they may be connected with smell instead, or it is not impossible, owing to the close relation of these senses even in the highest animals, that they might perform a double office. The wax-secreting glands located on the dorsal surface of each segment consist of circular groups of large pavement cells disposed beneath the epidermis.

Prof. Thomas, in his work on Aphididæ (8th Rept. State Entomologist of Ill.), places this species in the genus *Schizoneura*, but following the venation of the wings according to which the genera are divided, it cannot be placed in this genus since the third discoidal vein is not forked, while in other characters, as well as this, it agrees with *Pemphigus*.

The venation, however, is not constant, for in examining the wings of over thirty specimens, one was found in which the third discoidal of the front wing was distinctly forked, while in one other the second oblique of the hind wing was forked.

* Can this structure be analogous to the "taste goblets" which are found in the fungiform and circumvallate papillæ of the human tongue?

The hooklet which attaches the hind wing to the front one is composed of five pieces side by side, like the fingers of a hand. It fits into a fold of the hind border of the front wing, which lies at the termination of the first discoidal vein.

The observations here recorded were made during the past winter in the Cambridge Museum of Comparative Zoology, while studying under the direction of Dr. H. A. Hagen, to whom I am under lasting obligations for valuable aid and for the use of material and books with which to pursue my work.

REMARKS ON THE GENERIC CHARACTERS OF THE NOCTUIDÆ.

BY JOHN B. SMITH, NEW YORK.

“I can get along very well with the Butterflies, and I know something about Beetles, but the *Noctuidæ* were always a great puzzle to me.” So writes one of my correspondents, and to the same effect are expressions, both oral and written, from nearly all the collectors I have had any acquaintance with. And yet there is no good reason why the *Noctuidæ* more than the other families or groups should be considered so very difficult. True that the species are often very closely allied, and true also that there is often more difference between variations of one species than there is between valid (so considered at present) species. Yet there are many excellent characters in the *Noctuidæ*, easily recognized and readily discerned, which make the placing an unknown species into its proper genus a task of little difficulty.

The truth is that the *Noctuidæ* are not so difficult a group *per se*, but the sources of information concerning it are so various, so difficult of access, and so foggy when they have been discovered, that even if the student happens to know the language in which his work is written, the information derived scarce repays the trouble bestowed upon the search. Later writers have done little to lift the veil which concealed knowledge from the eyes of others. Species there have been described in very large numbers, and genera have been created with exceeding great liberality, and the result is that the beginner is appalled at the chaos which confronts him in Entomology, and takes to Botany or some other branch of natural